

writings of Hermann Kopp, and the more recent contributions of Berthelot, leave little to be desired in completeness, and provide a repository of information invaluable for purpose of reference. This, however, is literature for the fully fledged chemist or chemical author.

The chemical student requires something different. The importance to him of attending to the historical aspect of chemistry is recognised by most teachers. It is indeed maintained by some that there is no other satisfactory way of approaching even the elements of chemistry, than by performing experiments in historical order. A Board School might be cited where the older boys are given the Alembic Club reprints, and asked to do the experiments as there described. Whatever may be thought of this, it cannot be denied that a study of chemical history is most important, not only for a clear grasp of the origin and growth of our present theories, but because of that more subtle influence on the mind and imagination which perhaps may be included in the much-abused word culture.

The full advantage of historical study is not to be obtained by the reading of such a work as the one under notice, but rather by the careful study of those original memoirs or books which will ever remain landmarks in the track of scientific progress. At the same time, a connected history is a useful and perhaps a necessary adjunct to these partial studies, and this want is met extremely well by the book under notice.

Prof. Ladenburg has cast his story in the form of lectures, and for the purpose in view this is a satisfactory arrangement. In tracing the history of chemistry from the time of Lavoisier to the present day a vast amount of material has, of course, to be dealt with; and of the prodigious amount of reading and critical examination entailed upon the author there is abundant evidence both in the text and in the numerous references which are appended. As to the general balance of the book it may be said that the earlier part is fuller and more explanatory than the later. The account, for example, of the controversy between Berthollet and Proust is very clear and interesting, whilst the accounts of the controversies that raged later in the century in regard to fundamental questions of organic chemistry are much more compressed and difficult to follow. The last chapter of the book is little more than an enumeration of the chief chemical topics that have engaged attention during the past fifteen years.

However, looking at the book as a whole, it must be said that Prof. Ladenburg has produced a most useful history, extremely readable considering the inevitable compression, remarkably free from the bias of personal opinions, and giving a connected view of the progress of chemical science which will be of great benefit to students.

Dr. Dobbin has succeeded admirably in the arduous work of translating narrative German into narrative English. Here and there sentences are to be found which declare their origin; but on the whole the English (or should one say British?) flows smoothly, and there is a remarkable absence of typographical errors or mistakes of a more serious kind. Dr. Dobbin and the Alembic Club may certainly be congratulated on their latest contribution to chemical literature.

A. S.

NO. 1617, VOL. 62]

OUR BOOK SHELF.

Untersuchungen über Mikrostrukturen des erstarrten Schwefels nebst Bemerkungen über Sublimation, Überschmelzung und Übersättigung des Schwefels und einiger anderer Körper. By O. Bütschli. Pp. iv + 96; 4 plates. (Leipzig: W. Engelmann, 1900.)

Untersuchungen über die Mikrostruktur künstlicher und natürlicher Kieselsäuregallen (Tabaschir, Hydrophan, Opal). By O. Bütschli. Pp. 287-348; 3 plates. (Reprinted from *Verhandl. d. Naturhist.-Med. Vereins zu Heidelberg*, N.F. Band vi. 1900.)

A PREVIOUS work by the professor of zoology at Heidelberg ("Untersuchungen über Strukturen," 1898), reviewed in NATURE (vol. lx. p. 124), dealt more especially with the microstructure of organic substances, comparing them with the supposed alveolar structure of protoplasm. In the first of the present pamphlets the author describes in minute detail his observations in the same direction made on inorganic substances, more particularly sulphur. Amongst the various globular and crystalline forms produced by the sublimation and subsequent transformations of sulphur, he describes some which have a radial or concentric arrangement of vacuities or air-spaces suggesting an alveolar structure. The subject is, however, treated throughout from a crystallographic rather than from a biological point of view, and much the same ground has been covered in a more concise and earlier paper by Dr. R. Brauns, the professor of mineralogy at Giessen ("Beobachtungen über die Krystallisation des Schwefels aus seinem Schmelzfluss," *Neues Jahrb. f. Mineralogie, &c.*, 1899, Beil.-Bd. xiii. pp. 39-89; 7 plates).

The second pamphlet describes with equal minuteness the appearances shown under the microscope by chips and thin sections of dried gelatinous silica, as well as of the natural forms of colloidal silica, tabascheer and opal (including hydrophane and precious opal), which are all very similar in their minute structure.

Both pamphlets are admirably illustrated with numerous well-prepared microphotographs.

The School Journey. A Means of Teaching Geography, Physiography and Elementary Science. By Joseph H. Cowham. With additional "Journeys" by G. G. Lewis and Thomas Crawshaw. Pp. 79. (London: Westminster School Book Depot, 1900.)

FOR many years the study of geography at the Westminster Training College has been supplemented by an excursion from Croydon to Godstone, under the guidance of Mr. Cowham, the lecturer on education at the college, and the author of several excellent educational works. In this volume a description is given of the chief characteristics observable during the ramble; and horizontal and vertical sections, as well as photographic illustrations, elucidate the physical geography of the district traversed. In addition, the book contains accounts of excursions to Greenwich and Woolwich, and along a river bank in Lancashire, contributed by two of Mr. Cowham's former pupils.

The book appears at the right psychological moment; for the feeling that geography should, whenever possible, be made an outdoor study, is spreading, and every statement of experience is of value to teachers who want to improve methods of instruction in geography but are unable to see clearly how to carry out schemes which have been put on paper by persons who may not have given full consideration to ways and means. Here, however, we have notes upon actual excursions and how they were planned and performed, and with these before them, teachers should have no difficulty in arranging others if they have some knowledge of physical geography. The Geologists' Association and Prof. Seeley's Geological

Field Class provide teachers in London or the neighbourhood with exceptional opportunities for acquiring a knowledge of the significance of the geological structures and formations in the home counties, and Mr. Cowham's book will show them how the facts can usefully be applied to school excursions.

Air, Water and Food. By Ellen H. Richards and Alpheus G. Woodman. Pp. 226. (London: Chapman and Hall, Ltd. New York: John Wiley and Sons, 1900.)

OF the many volumes which have been written on these subjects, there are few which, in the opinion of the writer, can be more safely recommended to the student of sanitary science. Each of the three subjects is introduced and fairly discussed in language which is clear, trenchant and concise.

The authors are, moreover, no mere theorists, but describe the operations of the laboratory in a business-like fashion which leaves no doubt about their practical knowledge. The diagrams are more successful as illustrations than the photographs, in which, as frequently happens, the glass apparatus has such an ill-defined and ghost-like appearance as to be unrecognisable by the unprofessional eye. In other respects the book is well got up.

J. B. C.

Elementary Physics and Chemistry, ii., iii. By R. A. Gregory and A. T. Simmons. Second stage, pp. vi + 140; third stage, pp. vi + 114. (London: Macmillan and Co., Ltd., 1900.)

THESE two volumes complete a work of three parts, consisting of a course of experimental illustration of the elementary principles of chemistry and physics. The syllabus of subjects considered is based on the new Code issued by the Education Department, but the descriptions are by no means confined to it. The subject-matter is arranged in the form of a succession of separate gradated lessons, each consisting of description of apparatus, method of conducting experiment, results obtained and the reasons for them, short summary, and a set of exercises. The books thus arranged seem especially valuable to teachers having to give a comprehensive course in a definite number of lessons—in Evening Continuation Schools, for instance—as the whole work to be gone through may be at once divided into sections. Numerous excellent illustrations add considerably to the utility of the volumes.

C. P. B.

Principes D'Hygiène Coloniale. Par Le Dr. Georges Treille. Pp. iv + 272. (Paris: Georges Carré et C. Naud, 1899.)

THIS useful little volume is addressed particularly to those who wish to inform themselves of the physical conditions of life in the tropics with a view to living there, and to those who have an indirect interest in tropical regions. The earlier portion of the volume deals with tropical climatology in general, and in particular with the climatology of the French colonies. A chapter is devoted to considering the action of the climate on bodily functions. The latter portion deals with public and domestic hygiene. In the discussion on European habitations in the tropics, one would have wished to see more stress laid on the importance of Europeans living apart from the natives—a custom which has been so universally adopted in India, and which no doubt accounts to a large extent for the comparative freedom of Europeans from malaria in that country.

We fully endorse the indictment of the use of alcohol specially in the form of absinthe, but we should have liked to see more information on measures to be taken to ensure a supply of good water for domestic purposes.

C. B. S.

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

Genesis of the Vertebrate Column.

IN the review of "The Foundations of Zoology," by Prof. W. Keith Brooks, which was contained in the last number of NATURE, the reviewer quotes from him the following sentence:—"Herbert Spencer tells us that segmentation of the backbone is the inherited effect of fractures caused by bending."

Before the reader accepts this version of my view, he would do well to read §257 of "The Principles of Biology." The simplest expression of that view is contained in the criticism of Prof. Owen's "Theory of the Vertebrate Skeleton," originally published by me in the *British and Foreign Chirurgical Review* for 1858, and now appended to "The Principles of Biology." The sentence setting it forth runs thus:—

"The production of a higher, more powerful, more active creature of the same type, by whatever method it is conceived to have taken place, involved a change in the notochordal structure. Greater muscular endowments presupposed a firmer internal fulcrum—a less yielding central axis. On the other hand, for the central axis to have become firmer while remaining continuous, would have entailed a stiffness incompatible with the creature's movements. Hence, increasing density of the central axis necessarily went hand in hand with its segmentation; for strength, ossification was required; for flexibility, division into parts."

There is here no mention or thought of "fracture"—no implication of a dense part formed and then broken, but the implication of dense matter being deposited in successive separate portions, in such way as to fulfil the two requirements of strength and flexibility.

HERBERT SPENCER.

Brighton, October 21.

Albinism and Natural Selection.

A CASE of partial albinism in fishes which has recently come under my notice is likely to be of general interest from the evidence it apparently affords of the value of the normal specific coloration of predaceous fishes, and of the serious disadvantage of conspicuous abnormalities.

A white-skinned specimen of the common hake (*Merluccius merluccius*, L.) was trawled in the Bristol Channel last week amongst a catch of normal hake, and was sent to me from Milford immediately on landing, owing to the fishermen's impression that it belonged to some rare species unknown to them.

It was, however, perfectly normal in all respects except its remarkable leanness and the absence of all pigmentation from the external skin and the inner lining of the buccal cavity and gill-covers. The pigmentation of the retina and peritoneum was normal.

In a normal hake there is a profuse black pigmentation over the upper part of the body, as well as over the inside of the mouth and gill-covers. The general appearance of a normal hake is consequently dusky; that of the abnormal specimen was white.

The lean and emaciated condition of the white hake was very striking, especially in the head region, where not only the bony ridges of the skull and cheeks projected sharply beneath the thin layer of skin, but even the lines of sculpture of the superficial bones were plainly recognisable. In a normal hake, of approximately equal length, with which I compared the specimen, these details were quite invisible, and the bony ridges were rounded off or hidden by the plumpness of the integument. In girth and weight the albino was far inferior to the normally pigmented fish. The albino measured 26½ ins. in length to the base of the caudal fin, and 6½ ins. in length of head (from snout to opercular spine). Its girth round the back of the head was 9 ins., and just behind the 10th anal finray 9½ ins. The normal hake measured 27½ ins. in length, and had the same length of head as the albino. Its girth in the same two regions was 10½ ins. and 10½ ins. respectively. The albino weighed 4 lb. 5 oz., the normal hake 5 lb. 9½ oz., both fish being gutted in the same way.